Southwest Alaska Network
Vital Signs Monitoring Program

Aquatic Monitoring of Large Lakes and Rivers– *A Conceptual Framework and Process for Making Reasoned Decisions*

REQUEST FOR PROPOSALS

November 1, 2003

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To facilitate the review process, applicants must submit proposals in both paper and electronic format. Please see the RFP for complete details.
DEADLINE NOTICE: Hardcopy and electronic versions (no facsimiles) of proposals must be RECEIVED by the Southwest Alaska Network Coordinator by close of business on December 19, 2003.

Background

In order to protect National Parks for future generations, it is vital that the National Park Service (NPS) observes and understands the condition of natural resources in parks. To address this need, NPS implemented a strategy known as "vital signs monitoring," to develop scientifically sound information on the status and long-term trends of park ecosystems, and to determine how well current management practices are sustaining those ecosystems < http://www.nature.nps.gov/im/monitor/>.

Vital signs monitoring is being accomplished in Networks of National Parks grouped by geographic similarities, common natural resources, and resource protection challenges. The Southwest Alaska Network (SWAN) includes five National Park Service units: Alagnak Wild River, Aniakchak National Monument and Preserve, Katmai National Park and Preserve, Kenai Fjords National Park, and Lake Clark National Park and Preserve. In 2001, this network began the process of planning a long-term monitoring program for natural resources (Bennett et al 2003).

SWAN Parks contain some of the largest and most "pristine" freshwater resources in the National Park System. This includes the two largest lakes, Naknek Lake and Lake Clark, numerous multi-lake systems, and thousands of miles of rivers, including five designated "Wild Rivers." Surface water covers approximately 432,000 acres (12 percent) of Katmai. Aquatic systems in the western portions of Katmai and Lake Clark are so extensive that they form the template upon which biological systems at all levels are organized.

Aquatic systems in network parks are relatively pristine in the sense that: a) natural watershed processes are operating, including disturbances such as flood events and seasonal changes in flow; b) water quality is unimpaired (there are no designated 303d surface waters); and c) aquatic fauna diversity and productivity vary naturally over both time and space. Aquatic and terrestrial animals have likely had a very long, and probably co-evolutionary, relationship with salmon in each of these parks. The interrelationships between sockeye salmon (*Oncorhynchus nerka)*, and salmon consumers such as brown bears *(Ursus arctos horribilis)*, is a flagship ecological resource of the network, and of national and international significance.

Problem Statement

A goal of aquatic monitoring in SWAN is to track the condition of physical habitat attributes and key biological parameters that control and express the long- and short-term behavior of aquatic systems (e.g., change in habitat quantity and quality, and fish and wildlife response to changes). During scoping workshops in 2002-2003, park staff and invited scientists identified how anadromous fishes link the ocean, fresh water, and land in important functional ways, supporting a complex food web that is a “keystone” ecological resource (Bennett et al 2003). Workshop participants also identified how natural change and humans might affect anadromous fish and aquatic habitat and the role that long-term monitoring can play in tracking changes in this relationship.

Selection of parameters to monitor is an important scientific and management question because not all processes, habitats, or species are equally valuable or useful for signaling change. SWAN seeks to "understand how landscape, oceanic, and atmospheric processes interact with rivers, lakes, and watersheds to affect park resources that are ecological keystones or highly valued by stakeholders and visitors" (Bennett et al 2003). To meet this objective, monitoring will need to address environmental conditions, biophysical characteristics of watersheds, salmon, and biotic consumers that are functionally linked to the availability of salmon.

Scoping workshops identified management issues, reviewed conceptual ecosystem models, and developed monitoring questions aimed principally at detecting and understanding change. As part of this process, it was recognized that the changes are most likely to occur from four interactive drivers of change (e.g. climate/landform/ocean interactions, natural disturbance, biotic interactions, and human activities). It was also recognized that changes are likely to occur over varying temporal and spatial scales. For example, climate change may result in a gradual change in lake water levels that occurs over decades and has impacts over the entire network, and beyond. On the other hand, impacts from lake shoreline development will likely be more episodic and local. Thus, one challenge of designing a monitoring program for SWAN is to detect changes occurring over widely varying scales of space and time.

Conceptual ecosystem models developed by SWAN staff during early stages of planning fell short of elucidating all the complex interactions involving aquatic habitat and salmon, such as the relationships between upslope watershed changes and aquatic/riparian habitat responses at basin and network scales. Aquatic ecosystems are diverse, comprising numerous categories of biotic and abiotic elements that potentially could be included within an ecological monitoring program. When each of these categories is further divided into species assemblages and habitat-specific communities, the potential elements that could be monitored number in the hundreds.

A key step in the next phase of planning is to identify where to focus monitoring efforts. In support of this, additional modeling is needed to depict our understanding–

retrospective and contemporary–of how climatic, oceanic, geologic, and hydrologic forces have shaped aquatic habitat, regulated salmon abundance, and structured food webs. It is also necessary to narrow the list of candidate "indicators" identified during scoping workshops and identify those indicators that have been shown to be empirically (or theoretically) linked to actions and outcomes involving physical habitat and biotic attributes. Finally, it is necessary to develop specific aquatic monitoring alternatives that can detect change at multiple scales and fit within budgetary constraints.

Tasks

Phase 1

1. Establish a historical GIS database that identifies types and locations of data of interest in designing a long-term aquatic monitoring program in Southwest Alaska and provide a visual means of selecting sites based (in part) on the locations for which historical data is available. This database will identify ongoing monitoring involving aquatic habitats, water quality, fish, and aquatic wildlife. (Successful applicant will be given access to existing NPS GIS layers.)

2. Develop a conceptual framework (model) for aquatic SWAN ecosystems addressed by monitoring objectives that consists of key processes and their essential elements. Identify how interactive drivers (climate, natural disturbances, biotic interactions, and humans) have the potential to affect the essential elements of each process and link them to elements in the conceptual model. Identify the potential biotic and physical consequences of interactive drivers and display their links to elements in the conceptual model.

3. Finalize "indicators" (vital signs) and metrics to measure based on conceptual models, objectives and monitoring questions, and preliminary recommendations resulting from workshops conducted over the past year. Where possible, identify what constitutes detectable and meaningful changes in habitat condition, plant or animal populations.

Phase 2

4. Provide alternative aquatic sampling designs that can detect change at multiple scales and fit within budgetary constraints. Each alternative will specifically identify the metrics to be sampled, frequency of sampling, and when possible, suggest the location and number of sampling sites.

5. Develop and test monitoring protocols Identify studies that may be needed to finalize site selection, or sampling frequency determination. For example, additional habitat mapping may be required to finalize sites selection, and preliminary sampling may be necessary in order to estimate the number or sizes of sampling units needed to detect change with reasonable power.

Eligibility
Eligible organizations include colleges, universities, private organizations, and local, state, and federal government agencies

Proposal Evaluation and Selection Criteria
Proposals will be judged according to how well they address the following:

1. Demonstrated understanding of the principles of complex interactions in large subartic lake and river systems, especially those influenced by anadromous salmon.
2. Familiarity with existing freshwater lake and river long-term monitoring designs and approaches as they relate to the proposed project.
3. Overall technical merit of the proposal and credentials of the investigators.
4. Integration with other research and monitoring activities in Alaska or the Pacific Northwest.
5. Potential to enhance the technical infrastructure and abilities of the network.
6. Clarity and conciseness of the proposal.

Period of Performance
Work is to be completed in two phases within two years of the execution of a contract.

Schedule and Requirements for Proposal Submission
Please follow the proposal format listed below:

- Two(2) paper copies of each proposal must be RECEIVED by the SWAN office by close of business on December 19,2003.
- In addition, please submit an ELECTRONIC VERSION of your proposal, via either e-mail (preferred) or on diskette. Electronic versions must also be RECEIVED by close of business on December 19, 2003.
- Note: the recipient of this funding will be required to prepare a detailed workplan that must be approved before a contract can be completed and any work begun.

Send proposals and direct questions and requests for additional information to:
Alan Bennett
Southwest Alaska Network
National Park Service
240 West 5th Ave
Anchorage, AK 99501
alan_bennett@nps.gov
907/644-3681

Additional information on the Southwest Alaska Network such as maps and ecological profiles of parks, is available on their web site:
http://www.nature.nps.gov/im/units/swan/index.cfm

Technical Proposal Format Requirements

Proposals should adhere to following format and an 8 page maximum length (font size 12), not including budget information, references cited and investigator resumes.
TITLE - (provided).
POINT OF CONTACT: Name, organization, address, and electronic mail address.
ABSTRACT: Brief description of proposed work.
INTRODUCTION: Brief overview of what the project is, refer to material in this RFP.
OBJECTIVES AND TASKS: List the project's objectives (provided) and describe in detail the tasks that will be performed relative to each objective, including methods and approaches.
DELIVERABLES: Detailed description of the planned products from each task of the project. Required deliverables: consultation, annual progress reports, and a final report.
SCHEDULE: Timeline showing anticipated dates for completion of the major tasks and deliverables. Work is to be completed within two years of the execution of a contract.
DETAILED BUDGET JUSTIFICATION: Cost breakdown by major budget categories (i.e. personnel, equipment), linking costs to specific tasks/deliverables wherever possible.
TECHNICAL REFERENCES CITED: List all references used for the proposal (not included in the 8 page maximum total for the proposal).
CURRICULUM VITAE/RESUME OF PRINCIPAL INVESTIGATORS: Include up to 5 references for publications pertinent to proposed project. Please limit to one page per investigator, not included in the 8 page maximum total for the proposal.